

MULTIPLE FRACTURES.

WITH AN ANALYSIS OF 240 CASES AND A REPORT OF SIX PATIENTS WITH
MULTIPLE FRACTURES OF THE UPPER EXTREMITY.*

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VERY little is to be found in systematic works on surgery on the subject of multiple fractures; and, though there have been isolated reports of such cases, the subject, it seems to me, has not received the attention which it deserves. My own attention has been called to it from the unusual experience of having under observation at the Episcopal Hospital during less than five years, six patients with multiple fractures involving one upper extremity.

Malgaigne, almost alone among the writers of special monographs, consecrates some paragraphs to the questions of the frequency and prognosis of cases of multiple fractures. Among 2358 fractures from the records of the Hôtel-Dieu, he found 30 cases of multiple fracture, or 1.28 per cent. of the whole number. Among 5057 fractures which have been treated at the Episcopal Hospital within the last five years (1902-1906 inclusive), I have found records of 73 instances of multiple fractures, or 1.44 per cent.

According to Bruns, a series of 124 cases of multiple fractures was collected by Weber, Moritz, and Leisrink. Bruns found that among these patients the mortality was 40 per cent., no cases, of course, being included in which the original injury produced immediate death. The rarity of multiple fractures is due to this very fact, that so many patients die almost immediately after the injury. Among the 73 cases at the Episcopal Hospital, there were 20 deaths, a mortality of 27.4 per cent. In calculating this percentage, not only have cases of crush of

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the extremities, calling for immediate amputation, been excluded from the list, but those patients admitted in a state of profound shock, and dying in a few hours without reaction, have also been omitted; so that I think it is fair to conclude that 27 per cent. is close to the true mortality at the present day from multiple fractures themselves, without the added deaths that would be attributed to lesions of the brain and internal organs.

For the sake of comparison, the mortality of fractures in general may be seen from the following figures, which show that multiple fractures are just about ten times more dangerous than others:

PROTESTANT EPISCOPAL HOSPITAL, CASES OF FRACTURE 1902-1906.

Year.	Cases.	Recovered.	Died.	Mortality per cent.
1902.....	943	910	33	3.5
1903.....	927	899	28	3.0
1904.....	954	931	23	2.4
1905.....	1114	1088	26	2.3
1906.....	1119	1094	25	2.2
Total	5057	4922	135	2.7

Multiple fractures in general may be conveniently classified in three groups, as follows: I. Fractures of the skull or trunk and the extremities; *e.g.*, of the pelvis and the thigh, of the skull and the arm, of the spine and the foot, etc. II. Fractures of different extremities, including (*a*) Similar fractures, *e.g.*, of both legs, of both forearms, of both clavicles, etc.; and (*b*) Dissimilar fractures, *e.g.*, of the leg and the forearm, of the arm and the thigh, of the thigh and the opposite leg, etc. III. Multiple fractures confined to one extremity, as of the femur and one or both bones of the leg; of the humerus and one or both bones of the forearm, etc.

It is not usual to consider a fracture of two or more parallel bones, as of the ribs, or both bones of the forearm, or of the leg, as an instance of multiple fracture; still less should

a comminuted fracture, or even a multiple fracture of a single bone, be so considered. The latter injury is more correctly designated as a double fracture, a triple fracture, etc.

The accompanying table gives the distribution in 240 cases of multiple fractures, which have been collected from the following sources: Malgaigne, 30 cases; Index Catalogue of the Surgeon-General's Office, Series I, 100 cases; Series II, 37 cases; Records of the Episcopal Hospital, 73 cases.

DISTRIBUTION OF MULTIPLE FRACTURES.

	Mal-gaigne.	S.G.O., I.	S.G.O., II.	P. E. H.	Total.	Per cent.
I. Skull and extremities .	7	13	8	11	39	16.25
Trunk and extremities.	3	38	6	10	57	23.75
Skull and trunk	1	8	3	1	13	5.41
Trunk alone	0	5	3	2	10	4.20
II. Different extremities :						
Similar lesions	10	6	6	7	29	12.08
Dissimilar lesions.....	6	20	9	35	70	29.16
III. One extremity :						
Upper extremity.....	0	7	1	7	15	6.25
Lower extremity	3	3	1	0	7	2.90
Total	30	100	37	73	240	100.00

In addition to the above cases, Dr. W. J. Taylor and Dr. H. R. Wharton have each reported a case of such extensive multiple fractures that they deserve a class to themselves. Dr. Taylor's patient, who recovered, had in the left upper extremity fractures of the humerus through the surgical neck and through the middle of the shaft, and also of the radius and ulna close to the wrist; while in the right upper extremity she had a T-fracture involving the condyles of the humerus, a fracture of the radius and ulna in their upper third, and of the radius in its lower third. Dr. Wharton's patient, besides a compound fracture of the nose, had a fracture of both bones of each forearm, and a fracture of both thighs; he did well for a week, and then died rapidly, possibly of fat embolism.

The mortality of the various combinations of fracture may

be seen in detail in the following analysis of the Episcopal Hospital cases :

MORTALITY OF MULTIPLE FRACTURES AT THE EPISCOPAL HOSPITAL,
1902-1906.

	Total.	Rec.	Died.	Mortality per cent.
I. Of skull or trunk, and extremities :				
1. Skull and { Upper extremity.....	6	6	0
{ Lower extremity.....	5	2	3	60.00
2. Trunk and { Upper extremity.....	8	3	5	62.50
{ Lower extremity.....	2	1	1	50.00
3. Skull and trunk	1	0	1	100.00
4. Trunk alone	2	2	0
II. Of different extremities :				
1. Similar Lesions :				
Both forearms.....	3	3	0
Both femora	2	0	2	100.00
Both legs.....	2	2	0
2. Dissimilar Lesions :				
Upper and lower extremities....	20	15	5	25.00
Both upper extremities.....	6	6	0
Both lower extremities.....	9	7	2	22.50
III. Confined to one extremity :				
Upper extremity	7	6	1	14.30
Lower extremity	0	0	0
Total.....	73	53	20	27.4

The great amount of violence which attends the production of all these fractures makes the prognosis necessarily grave, and renders the prospect of recovering useful limbs more dependent upon the character of the injury than upon the treatment employed. When the head or trunk is involved, the injury is more apt to be due to a fall from a height, or to the patient being caught in machinery and tossed against the walls of the room. It is often due to the patient being struck and thrown by a locomotive or a trolley car. In the second class the patient is more apt to have been injured by a crushing force, as the passage of a wheel over the extremities, or the fall of a heavy beam. In the third class, which is the smallest of all, and to which all of the patients reported to-night belong, falls and machinery accidents hold about equal place. In the 18 examples of this injury which it has been possible to find

recorded, the cause in 4 is unknown; in 7 the patients were caught in revolving machinery, in 5 they were injured by falls, and in 2 the accident was due to their being knocked down, run over, and dragged by moving vehicles.

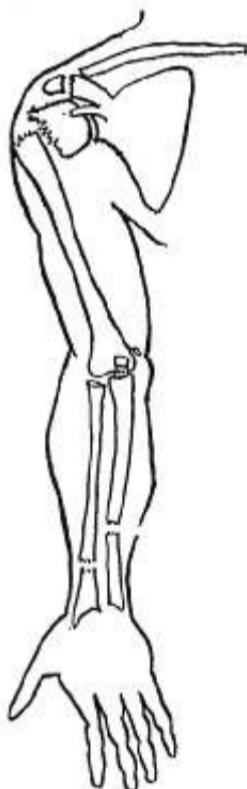
In such severe injuries as these it is frequently impossible to do more for the patients when they are first admitted than to combat the shock. Thus in one of the cases reported to-night, reduction of a dislocated hip was not accomplished until the third day after admission; and in another patient over three weeks elapsed before his precarious condition made it seem advisable to have him removed to the second floor for skiagraphic examination. It is on this account that accurate coaptation of the fragments cannot always be obtained, as well as for the reason that the injuries to the soft parts are often of more pressing importance.

The chief difficulty in the treatment of multiple fractures involving the upper extremity consists in the fact that many of these patients are necessarily confined to bed for a number of weeks after the injury, and that therefore deformity in the humerus is hard to prevent, since the weight of the forearm, which is available in the ambulatory treatment of fractures of the humerus, cannot be used when the patient is confined to bed. This fact, together with the absolute obliteration of all landmarks from oedema, was the cause in Case I of the projection of the lower fragment at the shoulder joint, so as nearly to penetrate the skin, necessitating excision. In Case III the muscular contraction was so violent and spasmodic that even the use of weight extension to the lower fragment of the humerus, while the patient was in bed, suggested by Dr. Hutchinson, together with heavy shot bags over the seat of fracture, was not sufficient for a long time to keep the fragments in position.

In spite of the gravity and extent of the injuries, if once the patient survive the immediate effects of the accident, there is no good reason why union of the fractures should not occur, and the limbs prove eminently useful. Indeed, Dupuytren contended that the very multiplicity of the fractures tended

to promote rapid healing, since the pain, discomfort, and inflammatory reaction are distributed among many parts, instead of being concentrated in one: somewhat upon the same principle, I suppose, that it is said a man does not feel the dentist treading on his toe while his tooth is being pulled.

FIG. 1.



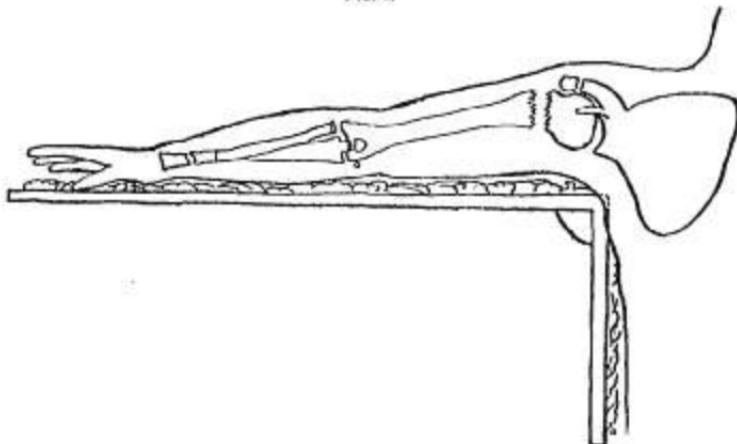
CASE I.—Fracture of acromion, of surgical neck of humerus, of internal epicondyle, of olecranon, of radius, and compound fracture of ulna.

Dupuytren says (I quote from Packard's translation of Malgaigne) "that the danger of wounds and fractures, although doubtless increased by an increase in their number, is still not in direct ratio with that number. At first sight, one would

presume that several fractures complicating one another would naturally react unfavorably, each one thus giving rise to graver symptoms than if it had occurred alone. Now, the contrary is true; when there are several fractures, each one induces slighter symptoms than if it were by itself; and Dupuytren, after at first viewing this fact with astonishment, became assured of it, and looked for it subsequently, as natural and to be expected." These remarks of Dupuytren prove the correctness of that saying of Heister: "*In prædicendis fracturarum eventibus magna utique chirurgis opus est circumspectione.*"

I am indebted to my chiefs at the Episcopal Hospital for permission to report the following cases. The first four, in

FIG. 2.



CASE I.—After excision of part of shaft of humerus, arm was dressed at right angle with chest.

the services of Drs. Neilson, Deaver, and Harte, came under my care as resident; and the two last were treated this winter in the out-patient department:

CASE I.—Michael C., 15 years (P. E. H. No. 867), admitted May 6, 1902, had fallen 40 feet from the side of a ship where he was at work, landing on the dock. *Diagnosis:* Fracture of both bones of forearm, in lower third (compound of ulna); fracture of olecranon; fracture of internal epicondyle of humerus; high

fracture of surgical neck of humerus; fracture of acromion process of scapula; shock. The fractures all involved the right side. The dressing consisted of a Bond splint, an axillary pad and a shoulder cap of binder's board; the arm was bandaged to the chest, the elbow being extended and the forearm in supination. The dressings were changed every other day at first, owing to the very great œdema. Ice-caps were applied to the arm from shoulder to elbow. The œdema in a few days became so great that it was uncertain whether gangrene might not ensue.

May 11.—The œdema is less. The wound of compound fracture of ulna is healing.

May 22.—Union progressing. Bone projecting beneath skin of shoulder thought to be comminuted acromion. Shoulder very black and blue. No landmarks palpable yet.

May 29.—Anterior obtuse angled splint, and posterior straight splint to forearm. Binder's board shoulder cap as before. Union apparently firm throughout. At normal site of coracoid process, below clavicle, is a bony prominence, apparently too large for coracoid, but it seems hardly possible that it is the head of humerus in subelavicular dislocation. The comminuted acromion moves with, and seems immovably fixed to shaft of humerus.

June 1.—Skiagraph of shoulder joint shows high fracture of surgical neck of humerus, upper end of lower fragment almost jutting through skin below acromion. The head of humerus is apparently in glenoid cavity. (Fig. 1.) Out of bed in wheelchair.

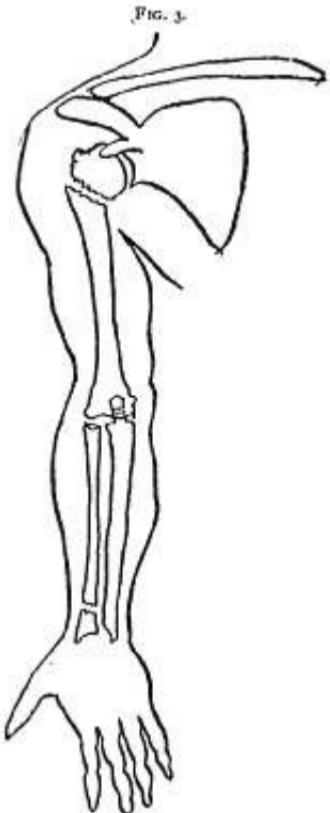
June 3.—Walking about ward. Four weeks since injury.

June 5.—*Operation:* Partial excision of right humerus, by Dr. Thomas R. Neilson. Ether. Incision in line of deltoid fibres from acromion down about 5 inches. Muscular fibres separated and bone bared. Shaft of humerus united by fibrous union in malposition with head of humerus. Fracture below anatomical neck. Fragments separated, shaft turned out through wound, and about $1\frac{1}{2}$ inches excised, subperiosteally, with saw and nippers. End of shaft returned and fractured parts put in good position. This was accomplished by abducting the arm to a right angle with the body. (Fig. 2.) Iodoform gauze drain, silkworm gut sutures. Arm dressed in semipronation, and held at right angles with body by long right angled splint. Short posterior splint to forearm, and shoulder cap of binder's board.

June 6.—Dressings reinforced on account of bloody ooze. Much pain all night, none to-day.

June 9.—Dressed. Parts in excellent condition; about half of gauze drain removed. The fractures of forearm show slight anterior bowing. No special dressing for olecranon.

June 12.—Dressed. Drain entirely removed. No oozing.



CASE II.—Fractures of surgical neck of humerus, of olecranon, and of radius.

June 15.—Dressed. Looped stitch at site of drainage tightened. All other sutures removed.

June 19.—Arm put at angle of 45° with body, with acute angled anterior splint in axilla. Slight anterior prominence of head of humerus corrected by a pad.

June 22.—Out of bed. While in bed lay very quietly on back. The best patient I ever had.

June 24.—Dressed with obtuse angled internal angular splint. Considerable pain in flexing elbow to this extent—about 135°.

June 30.—Dressed with right angled internal angular splint (Physick splint).

July 2.—Fergusson's dressing for fractures about shoulder. No splint to forearm, which is carried in bandage sling at wrist.

July 3.—Discharged cured; to return to Dispensary for occasional dressings.

February 20, 1907.—Returned in answer to letter. All functions of upper extremity are perfect, including rotation of forearm, and external rotation of humerus. From the left acromion to the head of the radius measures 29.5 cm. On the injured side the distance is 26.5 cm. There is no visible or palpable deformity anywhere. The patient, now a grown man, does heavy laboring work, and would not know his arm had ever been injured, except that it is a little shorter than the left, and he is therefore obliged to have his clothes made to order.

CASE 2.—E. B., 38 years (P. E. H. No. 1083), admitted June 1, 1902, was a fireman, and had fallen from a ladder. The height is not known. *Diagnosis:* Fracture of radius in lower third, fracture of the olecranon, and high fracture of surgical neck of humerus, all on the right side. *Dressing:* A straight anterior and short dorsal splint to forearm, the fracture of humerus being masked by great swelling.

June 5.—Skiagraph shows fracture of shoulder. Dressed with long straight anterior splint, from axilla to finger tips, and short dorsal splint to forearm, which was held in semipronation; shoulder cap of binder's board, and arm fastened to chest by broad binder. Lies on back very quietly. Redressed from time to time.

July 2.—Out of bed, elbow still in full extension.

July 3.—Obtuse angled internal angular splint applied; short posterior splint to forearm, and shoulder cap.

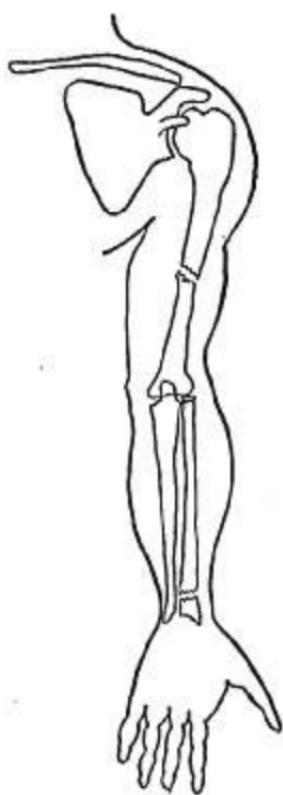
July 5.—Right angled internal angular splint, other dressings as before.

July 7.—Fergusson's dressing applied. Over 5 weeks since injury; all fractures firm, little deformity. Discharged.

It has been impossible to trace this patient.

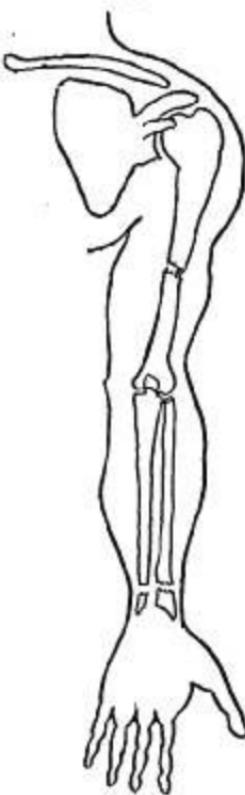
CASE 3.—J. C., 38 years (P. E. H. No. 2029), admitted September 27, 1902, was a pipe-fitter, and fell 40 feet from scaffolding, striking earth with left arm and shoulder. No unconsciousness. On admission: mind clear, considerably shocked.

FIG. 4.



CASE III.—Fracture of L. humerus below insertion of Deltoid, and Colles's fracture of L. radius. (Also dislocation of R. hip.)

FIG. 5.



CASE IV.—Fracture of L. humerus below insertion of deltoid; Colles's fracture L. radius, and fracture of L. ulna, lower fifth.

Diagnosis: Fracture of humerus below insertion of deltoid, and Colles's fracture of radius, both on left side; dislocation of right femur into ischiatic notch, where head of bone is easily felt: shortening $1\frac{1}{2}$ inches, adduction, and inversion of the affected

limb. Deformity of fractures easily corrected by extension and manipulation. *Dressing:* Bond splint to forearm; short internal splint to humerus, with shoulder cap of binder's board. Dislocation of hip not reduced on account of shock.

September 28.—Patient has reacted well. Under ether an unsuccessful attempt made to reduce dislocation by flexion and circumduction.

September 30.—Dr. Harte, with Drs. Neilson and Deaver in consultation. Patient again etherized, and hip successfully reduced by manipulation and vertical traction. Buck's extension and sand bags.

October 1.—Arm dressed. Colles's fracture in good position, forearm in semipronation. Fracture of humerus below deltoid in very bad position indeed, lower fragment drawn up into axilla, and upper jerking out against skin. With considerable difficulty fragments were brought into position and maintained with firm bandaging of shoulder cap. Hip painful. Patient very restless. Temperature 100° to 101° F. Ordered to take potassium bromide, gr. xx, every 3 hours.

October 4.—Dressed. Humerus recurs to its deformity as soon as bandages are removed, and probably was not in good position even before unbandaging.

October 5.—Dr. Hutchinson recommended weight extension from elbow. This was applied, with forearm in full pronation, and with upper arm abducted from body to angle of 45° . This dressing completely corrects the deformity. Shot bags laid on top of arm, over shoulder cap. Temperature nearly normal.

October 10.—Dressed. No union in humerus; deformity is apparently fairly well corrected when shoulder cap is in place. The upper fragment of Colles's fracture is in dorsal deformity, being supinated by the biceps, whereas the forearm must be kept in full pronation while weight extension is maintained. Patient is extremely contrary; will not lie still, pulls off bandages, kicks sand bags on floor, and seems to do everything possible to retard his cure. He has no delirium, and seems to be restless for the mere sake of aggravating his disorder.

October 17.—Dressed; some union of humerus. Extension to arm continued. Deformity less. Patient very much quieter. Hip extension removed. Three weeks since injury.

October 24.—Dressed. Four weeks since injury. Radial union good; position good; wrist a little stiff. Lower fragment

of humerus still tends to draw upwards and inwards. Patient of model deportment.

October 31.—Extension removed from arm. Five weeks since injury; 26 days since extension was applied to arm. Union in humerus quite firm. Little visible deformity; fair amount of callus. Arm brought in to side of chest; Bond splint left off; elbow flexed with difficulty to nearly a right angle; and a modified Fergusson's dressing applied. During use of extension to humerus, forearm was at angle of about 105° with arm, and elbow is now quite stiff. Sitting up makes patient faint and giddy. Right knee and leg feel somewhat numb. Functions normal, no pain at hip.

November 14.—Soon after last note got out of bed, and to-day was discharged.

February 19, 1907.—Returned in answer to letter. Still employed at Cramp's ship-yard, and says his arm is perfectly useful. There is no noticeable deformity. There is 0.5 cm. shortening in the fractured humerus, none in the forearm. No callus felt anywhere. Can completely extend elbow, but flexion beyond 80° is impossible. Pronation of forearm is complete, but supination is only about three-fourths complete—that is to say, there is rotation of about 135° instead of 180° .

CASE 4.—A. W., 65 years (P. E. H. No. 2387), admitted November 12, 1902, fell against the steps of the house where she lodged, while intoxicated. History of accident is incomplete. *Diagnosis:* Fracture of humerus below insertion of deltoid, Colles's fracture of radius, fracture of ulna in lower fifth—all on the left side; acute alcoholism, general contusions, acute bronchitis, lacerated wound of left eyebrow. *Dressing:* Bond splint, forearm in full supination; elbow extended; shoulder cap, axillary pad, arm bandaged to side. Lies on back in bed.

November 14.—Developed delirium tremens.

November 15.—Dressed. Fractures in fairly good position.

November 17.—Dressed. Delirium tremens worse.

November 29.—Pulse failing.

December 1.—Chill. Temperature 105.6° F.

December 2.—Diffuse bronchitis. Dressed.

December 6.—Stuporous. Temperature 101° F.

December 7.—Uræmic. Urine very scanty. Temperature 103.4° F. Fractures united in good position.

December 11.—Died. Temperature 108° F.

CASE 5.—H. D. E., 57 years (P. E. H. No. 3579), admitted November 26, 1906. Was knocked down and run over by coal wagon, while intoxicated. Admitted in semi-conscious condition. *Diagnosis:* Lacerated scalp, comminuted fracture of left humerus above insertion of deltoid; compound comminuted fracture of both bones of left forearm in middle third. Seen in Dispensary 5 days later, with no union of any of the fractures, overlapping of fragments of humerus, and deformity of forearm. Forearm was dressed in full supination, with long palmar and short dorsal splints; moulded coaptation splints of binder's board to humerus, with shoulder cap of same material, and arm bandaged to chest. Wrist supported by sling. Progress of case uneventful. Forearm alone was redressed December 10, and whole upper extremity redressed on December 13. All fractures were then found to be knitting. Redressed December 20 and December 27, on which latter date all fractures were found solid. There was considerable deformity from oedema below elbow, and apparently some outward bowing of bones of forearm. Only the long palmar splint and the shoulder cap were replaced.

January 5.—Dressed. Long splint on ulnar side of forearm, short dorsal splint, and a third splint on external (radial) surface, to overcome the outward bowing.

January 8.—Oedema much less. Lower fragment of radius apparently united to upper fragments of both radius and ulna, leaving lower fragment of ulna partially ununited. Same splints continued. Skiagraph made laterally shows some dorsal displacement of both lower fragments.

January 15.—Ulna seems firmer.

January 22.—Radius very firm. Skiagraph made antero-posteriorly confirms notes made January 8.

February 1.—Ulna is decidedly firmer. Rotation of about 45° from full supination. Only long dorsal splint continued.

February 12.—Referred to Orthopædic Hospital (Dr. G. G. Davis) for massage and passive motion.

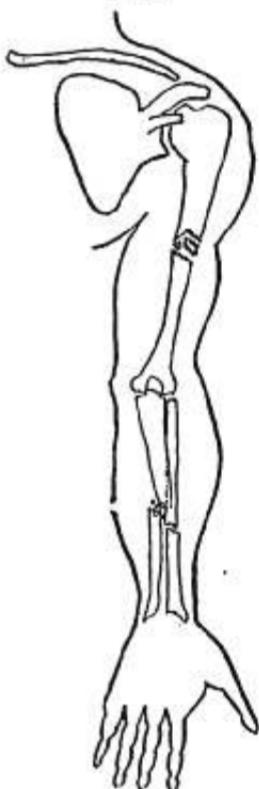
February 23.—Can almost make a fist. Rotation a little more extensive. To continue treatment.

March 25.—Has been working as usual, for some weeks, at saw-making. Finds little disability from injury. There is considerable deformity in forearm, the bones being bowed to radial

side. Rotation a little more extended. Can make a fist. Strength is normal.

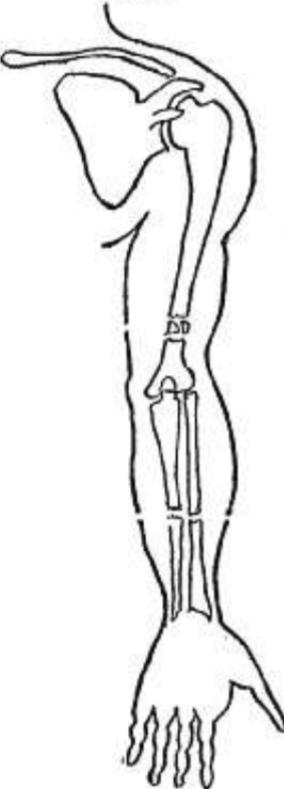
CASE 6.—A. M., 14 years (P. E. H. No. 3860), admitted December 22, 1906. Caught in belting, carried around and thrown to ground. *Diagnosis:* Compound comminuted fracture

FIG. 6.



CASE V.—Comminuted fracture of L. humerus, above insertion of deltoid; compound comminuted fracture of both bones of L. forearm.

FIG. 7.



CASE VI.—Compound comminuted fracture of L. humerus, lower third; compound fracture of both bones L. forearm.

of left humerus in lower third; compound comminuted fracture of both bones of left forearm at junction of middle and lower third. Seen in Dispensary nine days later. Some union in forearm, but

both bones were bowed to ulnar side. No union in humerus, the lower fragment being drawn up and back by triceps, upper fragment being pulled forward and in by deltoid and muscles of axillary folds. Dressed precisely like Case 5.

January 9.—Dressed. Position of all fragments excellent. Wound over inner surface of humerus healing, that over ulna scabbed. Fair union in all fractures.

January 16.—Dressed. All fractures firm. Moderate amount of callus over humerus; wounds all healed solid. Rotation of forearm from full supination to mid-pronation good.

January 23.—Dressed.

January 30.—Dressed. Long dorsal splint and shoulder cap only. All fractures solid, and motions good.

February 6.—To wear only a handkerchief sling. All functions perfect, except extension of elbow, which is possible only to 140° .

February 16.—Elbow can be extended to 150°

March 2.—Arm normal in every respect, but elbow can be extended only to 165° , owing to callus around comminuted fracture of humerus.

N.B.—Patients 1, 5 and 6 were exhibited to the Philadelphia Academy of Surgery, April 1, 1907.

For the sake of completeness the following abstracts of cases of multiple fractures confined to one upper extremity are added. These, with the six original cases just reported, comprise all examples of this injury it has been possible to find.

7. ALQUIÉ (Gaz. Méd. de Montpel., 1846-1847, vii, 84). Fracture of clavicle and humerus. (Access has not been had to this journal.)

8. BLUM (Arch. Gén. de Méd., 1887, xx, 214). Patient caught in revolving wheel: compound comminuted fracture of left humerus, fracture of left radius, and compound fracture of left ulna. Shoulder joint amputation on third day for traumatic emphysema. Recovered.

9. DAVIS, G. G. (Records of Episcopal Hospital, Phila., No. 320 of 1906). Male, 14 years, caught in revolving machinery. Admitted January 27, 1906. Shock; transverse fracture of left humerus in lower third, fracture of both bones left forearm in upper third, compound fracture of both bones left forearm in lower third, compound fracture of several fingers. Dressed on posterior splint; irrigation for 1 week. Recovered with good rotation of forearm, and flexion and extension of elbow. Discharged March 8, 1906.

10. GREEN (N. Y. Med. Record, 1880, xvii, 538). Caught in a re-

volving wheel: fracture of left humerus through surgical neck and in lower third; fracture of left ulna in upper third; compound fracture of left radius and ulna in lower third. Dressed in plaster of Paris; elbow in full extension for a week, then flexed to right angle. Recovered with good functions.

11. LABORIE (Bull. Soc. de Chir. de Paris, 1866-1867, 2 sér., vii, 297). Patient seen 3 months after injury, which had produced multiple fractures of right scapula, clavicle and humerus, and a posterior dislocation of right shoulder. Fractures all had united except in humerus, where false joint persisted.

12. MARIANI (Rev. de Med. y Cirug. práct., Madrid, 1882, vi, 110). Double comminuted fracture with wound of forearm and arm. (Access has not been had to this journal.)

13. NICHOLLS (Lancet, 1873, i, 877). Knocked down and dragged by horses: fracture of left humerus above deltoid, compound fracture below deltoid; posterior dislocation of left elbow, and fracture of both bones left forearm in middle third. Dressed in full extension for three days; splints then abandoned on account of œdema. Recovered with much deformity and poor function.

14. PACKARD (Internat. Encyclop. of Surg., Ashhurst, Revised Ed., N. Y. 1888, V. iv, p. 18). Male, 22 years, caught around a revolving shaft: fractures of humerus, radius, ulna, and metacarpus. Recovered with almost perfect functions.

15. PEZEVAT (Jour. Compl. du Dict. des Sc. Méd., Paris, 1831, xl, 276). Caught in revolving wheel: fracture of left clavicle, posterior dislocation of left elbow, and fracture of both bones of left forearm in lower third. Arm laid on pillows; recovered with fair function.

16. ROBERTSON and FIFIELD (Bost. Med. and Surg. Jour., 1877, xcvi, 570). Fall; fracture of right humerus above condyles, Colle's fracture of right radius. Dressed in full extension: good recovery.

17. SCHWARTZ (Bull. et Mém. de la Soc. de Chir. de Paris, 1904, xxx, 1102). Fracture of surgical neck of humerus, and fracture of lower extremity of radius. Plaster cast to forearm; and on sixteenth day after injury weight extension to humerus. Union reported progressing.

18. Since the above was written there has been admitted to the Surgical Dispensary of the Episcopal Hospital, another patient with multiple fractures of the upper extremity, for notes of which I am indebted to my Resident, Dr. Price. Male, 20 years, was caught in a revolving shaft on March 16, 1907. He sustained fractures of the left humerus in lower third, and of both bones of left forearm in middle third. He was treated precisely as were Cases 5 and 6: progress satisfactory.

REFERENCES.

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